WATER RESOURCES REVIEW for

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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

SEPTEMBER
1975

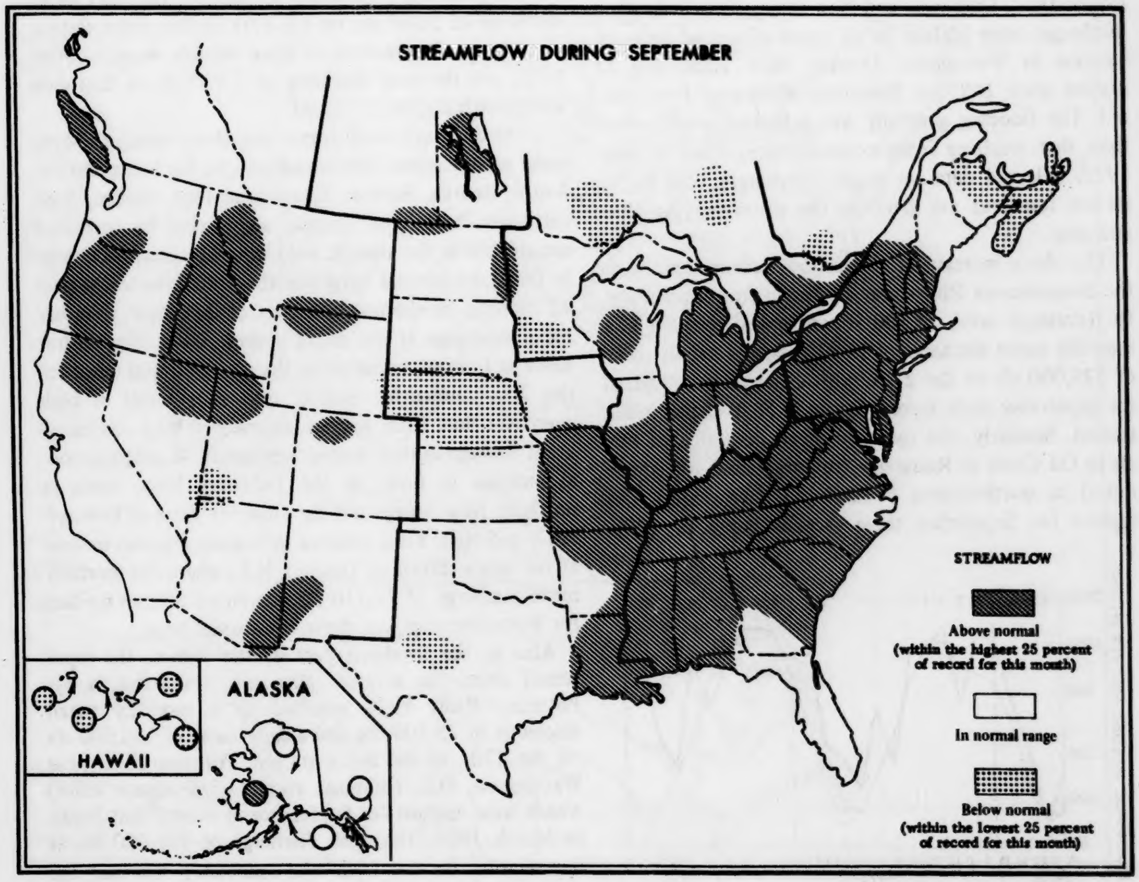
STREAMFLOW AND GROUND–WATER CONDITIONS

Streamflow generally decreased seasonally in southern Canada, in many central and western States, and in Hawaii and parts of Alaska; but generally increased in eastern and southwestern States.

Flows remained in the above-normal range in large areas in southeastern and northwestern United States, and in the below-normal range in smaller areas in eastern Canada, some north-central States, and in Hawaii.

Monthly or daily mean discharges were highest of record in some streams in Arizona, Florida, Michigan, New Mexico, and Pennsylvania; and lowest of record on the island of Oahu, in Hawaii.

Flooding occurred in Alabama, Kentucky, Maryland, Michigan, Missouri, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, and Puerto Rico. Most of the flooding in the east and south resulted from rains associated with tropical storm Eloise.



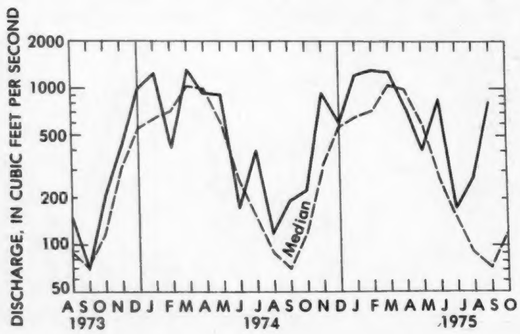
NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

STREAMFLOW GENERALLY INCREASED CONTRASEASONALLY AND WAS ABOVE THE NORMAL RANGE IN CENTRAL AND SOUTHERN PARTS OF THE REGION. FLOWS DECREASED AND REMAINED BELOW THE NORMAL RANGE IN PARTS OF NEW BRUNSWICK, NOVA SCOTIA, AND QUEBEC. MAJOR FLOODING OCCURRED IN NEW YORK, PENNSYLVANIA, MARYLAND, AND ADJACENT NORTHERN VIRGINIA.

Rapid runoff from the intense rains associated with tropical storm Eloise, September 22–26, resulted in major flooding in northern Maryland, northern Virginia, and the adjacent District of Columbia, and in central and southeastern parts of New York, and southern Pennsylvania. National Weather Service reported total rainfall of at least 10 inches at some observation points during the 5-day period. Minor flooding was reported in parts of Connecticut, Delaware, and New Jersey. Peak stages and discharges were highest in 31 years of record on some streams in Westchester County, New York, and 2d highest since 1889 on Monocacy River near Frederick, Md. The flooding generally was described as less severe than that resulting from tropical storm Agnes in June 1972. Selected data on stages, discharges, and gaging station locations are given in the accompanying table and map.

The sharp increase in streamflow near monthend in the Susquehanna River basin upstream from Harrisburg, Pa. (drainage area, 24,100 square miles) resulted in a monthly mean discharge of 73,930 cfs, and a daily mean of 529,000 cfs on the 27th, both of which were highest for September since records began in 1890 at that index station. Similarly, the monthly mean discharge of 808 cfs in Oil Creek at Rouseville (drainage area, 300 square miles) in northwestern Pennsylvania (see graph), was highest for September since records began in 1909.



Monthly mean discharge of Oil Creek at Rouseville, Pa. (Drainage area, 300 sq mi; 777 sq km)

Sharp increases in flow occurred also in Allegheny and Monongahela River basins in western Pennsylvania where monthly mean discharge of Allegheny River at Natrona and Monongahela River at Braddock were in the above-normal range and were about 4 and 7 times their respective September median flows.

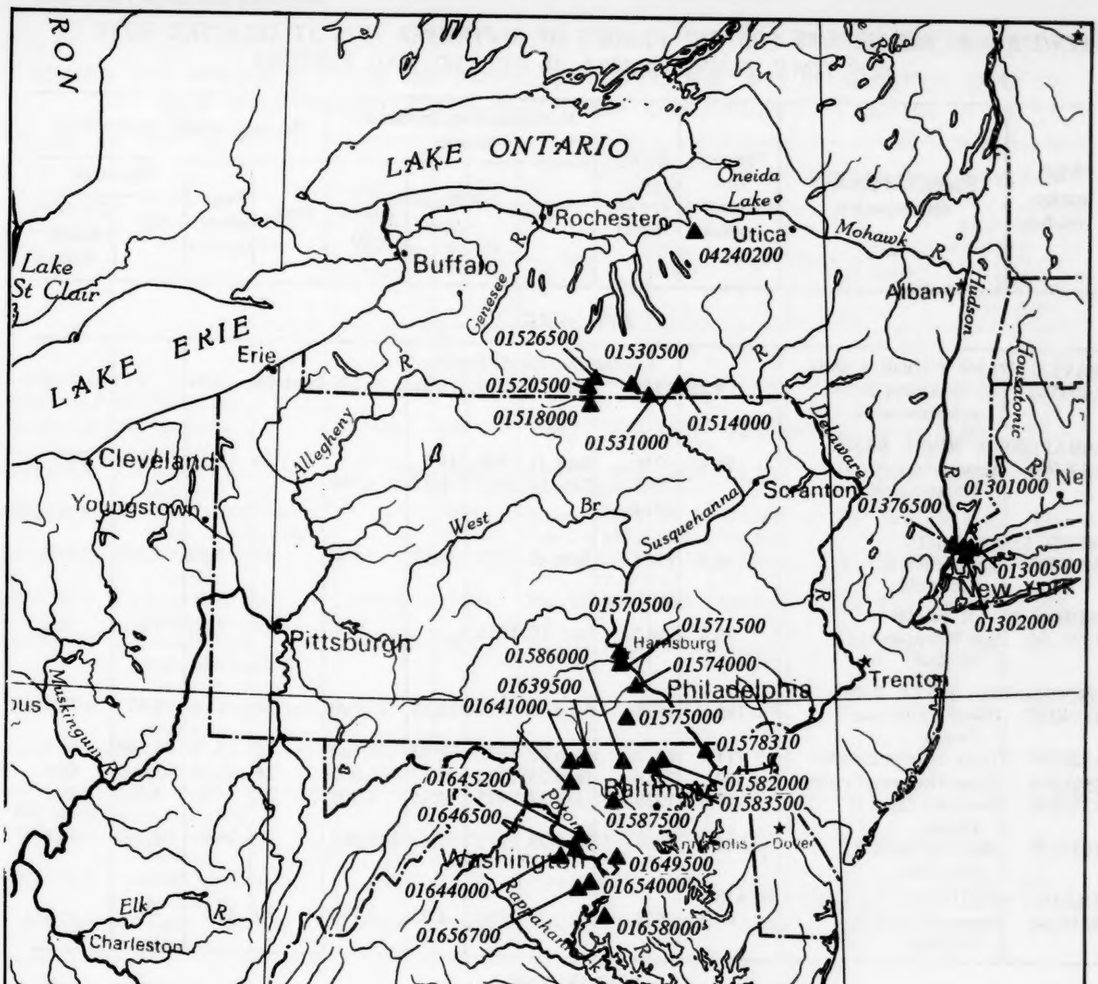
In western Maryland, monthly mean flow at the index station, Seneca Creek at Dawsonville increased into the above-normal range and was 11 times median. In the eastern part of that State, monthly mean flow of Choptank River near Greensboro increased contraseasonally, was above the normal range, and was about 9 times the September median flow.

In Connecticut, flooding was less severe than in June 1972. The peak discharge of 631 cfs on the 26th at the index station, Burlington Brook near Burlington (drainage area, 4.13 square miles) was 3d highest in record that began in 1931. In the southwestern part of that State, monthly mean flow of Pomperaug River at Southbury (drainage area, 75.0 square miles) remained in the above-normal range for the 3d consecutive month, and was 13 times the median for the month. The daily mean discharge of 3,040 cfs on the 27th at that index station was highest for September since records began in June 1932, and the peak discharge of 7,190 cfs on that date was the 4th highest of record.

In New Jersey, only minor overflows occurred along some small streams near monthend. At the index station, South Branch Raritan River near High Bridge, high carryover flow from August, augmented by increased runoff late in the month, held monthly mean discharge in the above-normal range for the 10th time in the past 12 months. In the northern part of that State, monthly mean discharge at the index station, Great Egg Harbor River at Folsom, remained in the above-normal range for the 7th consecutive month, also as a result of high carryover flow from August, augmented by a contraseasonal increase in flow during September. A contraseasonal increase in flows in the Delaware River basin in northern New Jersey and the adjacent areas of Pennsylvania and New York resulted in a sharp increase in flow at the index station at Trenton, N.J., where the monthly mean discharge of 12,110 cfs was about 3 times median for September and was above the normal range.

Also in the southern part of the region, the rapid runoff from the intense rains near monthend in the Potomac River basin resulted in a monthly mean discharge of 25,500 cfs, and a daily mean of 180,000 cfs on the 27th, at the index station, Potomac River near Washington, D.C. (drainage area, 11,560 square miles) which were highest for September in record that began in March 1930. The peak discharge of 195,000 cfs at that station on the 26th was apreciably less than the maximum peak discharge ot record.

In Massachusetts, New Hampshire, Vermont, and southern Maine, monthly mean flows increased into the



Map of part of eastern United States showing location of stream-measurement sites described in the table of peak stages and discharges.

Provisional data; subject to revision

STAGES AND DISCHARGES FOR THE FLOODS OF SEPTEMBER 1975 AT SELECTED SITES IN NEW YORK, PENNSYLVANIA, MARYLAND, AND VIRGINIA

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood			
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge	
									Cfs	Cfs per square mile
				NEW YORK						
BEAVER SWAMP BROOK BASIN										
01300500	Beaver Swamp Brook at Mamaroneck.	4.71	1943–	June 19, 1972	3.06	197	Sept. 26	3.84	273	58.0
MAMARONECK RIVER BASIN										
01301000	Mamaroneck River at Mamaroneck.	23.4	1938, 1943–53, 1954–	Sept. 21, 1938 June 19, 1972	[a]11.9 9.71	(b) 4,740	26	10.13	5,070	217
BRONX RIVER BASIN										
01302000	Bronx River at Bronxville.	26.5	1943–	June 19, 1972	9.63	2,500	26	8.92	2,170	81.9
HUDSON RIVER BASIN										
01376500	Saw Mill River at Yonkers.	25.6	1943–	Oct. 16, 1955	.....	890	26	7.26	1,010	39.5
SUSQUEHANNA RIVER BASIN										
01514000	Owego Creek near Owego.	185	1930–	July 8, 1935	10.50	23,500	26	11.06	10,200	55.1
01520500	Tioga River at Lindley . . .	771	1930–	June 23, 1972	26.27	128,000	26	23.73	73,500	95.3
01526500	Tioga River near Erwins . .	1,377	1918–	June 23, 1972	26.47	190,000	26	23.56	95,000	69.0
01530500	Newtown Creek at Elmira.	77.5	1938–	June 23, 1972	19.28	4,000	26	17.2	3,900	50.3
01531000	Chemung River at Chemung.	2,506	1903–	June 23, 1972	31.62	189,000	27	24.1	125,000	49.9
STREAMS TRIBUTARY TO LAKE ONTARIO										
04240200	Ninemile Creek at Camillus.	84.3	1958–	Mar. 30, 1960	8.25	2,760	26	10.8	(b)	....
				PENNSYLVANIA						
SUSQUEHANNA RIVER BASIN										
01518000	Tioga River at Tioga	282	1938–	June 22, 1972	19.70	59,000	27	15.29	33,000	117
01570500	Susquehanna River at Harrisburg.	24,100	1890–	June 24, 1972	32.57	1,020,000	27	23.81	539,000	22.4
01571500	Yellow Breeches Creek near Camp Hill.	216	1909–19, 1954	June 22, 1972	18.33	15,900	26	18.77	18,500	85.6
01574000	West Conewago Creek near Manchester.	510	1928–	June 22, 1972	30.26	18,700	26	32.11	93,000	182
01575000	South Branch Codorus Creek near York.	117	1927–	June 22, 1972	22.62	26,700	26	18.75	20,000	171
				MARYLAND						
SUSQUEHANNA RIVER BASIN										
01578310	Susquehanna River at Conowingo.	27,100	1967–	June 24, 1972	36.83	1,130,000	27	30.92	710,000	26.2
GUNPOWDER RIVER BASIN										
01582000	Little Falls at Blue Mount.	52.9	1945–	June 22, 1972	18.54	8,280	26	15.29	6,840	129
01583500	Western Run at Western Run.	59.8	1944–	June 22, 1972	26.0	38,000	26	12.64	8,000	134
PATAPSCO RIVER BASIN										
01586000	North Branch Patapsco River at Cedarhurst.	56.6	1945–	June 22, 1972	20.75	27,800	26	16.59	14,900	263
01587500	South Branch Patapsco River at Henryton.	64.4	1948–	June 22, 1972	28.14	26,900	26	21.16	14,500	225

STAGES AND DISCHARGES FOR THE FLOODS OF SEPTEMBER 1975 AT SELECTED SITES IN NEW YORK, PENNSYLVANIA, MARYLAND, AND VIRGINIA––Continued

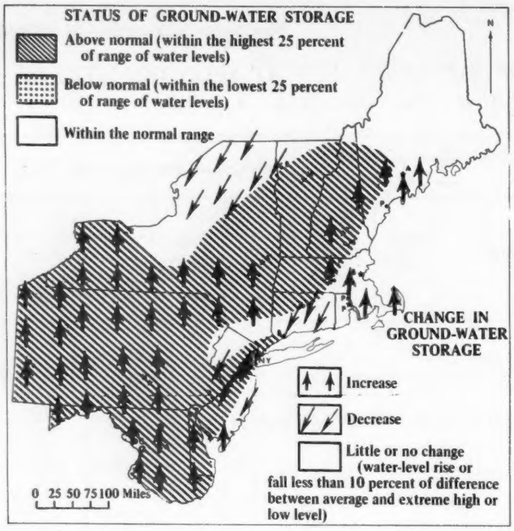
WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood			
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge	
									Cfs	Cfs per square mile
MARYLAND––Continued										
POTOMAC RIVER BASIN										
01639500	Big Pipe Creek at Bruceville.	102	1947–	June 22, 1972	17.86	22,800	Sept. 26	18.98	28,000	275
01641000	Hunting Creek at Jimtown.	18.4	1949–	June 22, 1972	5.26	1,330	26	5.48	1,930	105
01643000	Monocacy River at Jug Bridge near Frederick.	817	1889, 1929–	June 1889 June 23, 1972	30 35.9	56,000 81,600	27	30.83	61,300	75.0
01645200	Watts Branch at Rockville.	3.70	1957–	June 21, 1972	7.22	2,900	26	7.32	3,400	919
01646500	Potomac River near Washington, D.C.	11,560	1930–	Mar. 19, 1936	[c]28.1	484,000	26	13.39	195,000	16.9
01649500	Northeast Branch Anacostia River at Riverdale.	72.8	1938–	June 22, 1972	9.52	10,600	26	10.42	10,000	137
01658000	Mattawoman Creek near Pomonkey.	57.7	1949–	Aug. 13, 1955	7.52	9,300	26	7.50	9,300	161
VIRGINIA										
POTOMAC RIVER BASIN										
01644000	Goose Creek near Leesburg.	332	1909–12, 1930–	June 22, 1972	30.59	78,100	26	13.85	10,000	30.1
01654000	Accotink Creek near Annandale.	23.5	1947–	June 22, 1972	15.96	12,000	26	13	6,000	255
01656700	Occoquan Creek near Manassas.	343	1968–	June 22, 1972	50.31	56,400	26	25	22,000	64.1

[a]Result of hurricane wave.
[b]Not determined.
[c]Site then in use.

above-normal range and were about 3 to 6 times the respective September median discharges at index stations in those areas. At the index station, Little Androscoggin River near South Paris, in southern Maine (drainage area, 76.2 square miles) where monthly mean discharge during August was only 50 percent of median, flow increased sharply and the monthly mean flow of 48.3 cfs was 298 percent of median for September.

In the northern part of the region, monthly mean flows remained below the normal range in parts of New Brunswick, Nova Scotia, and Quebec. The monthly mean discharge of 26.5 cfs at the index station, St. Marys River at Stillwater, Nova Scotia (drainage area, 523 square miles) was only 5 percent of median but was greater than the September minimum monthly mean flow of 22.3 cfs which occurred in 1934. In extreme southern Quebec, where monthly mean flow of Coulonge River near Fort-Coulonge was below the normal range and only 43 percent of median during August, the monthly mean flow in September remained below the normal range and was 44 percent of median.

Ground-water levels rose in the southern part of the region except for falling levels in some parts of New Jersey and Connecticut, based on near-end-of-month reports. At monthend, levels in many or most of these wells in the two States may have begun to rise as a result of recharge from the heavy rains. Levels rose in east-central New England, and declined in northern New York (see map). Levels near monthend were above average in almost the entire region except for near-average levels in much of Maine and possibly southeastern New England. As a result of recharge from abnormally heavy rains during the month, levels in some wells were at or near their highest points for end of



Map shows ground-water storage near end of September and change in ground-water storage from end of August to end of September.

September in at least 20 years in some areas, including parts of Maryland, central Pennsylvania, east-central and western New York, and southern New Hampshire.

SOUTHEAST

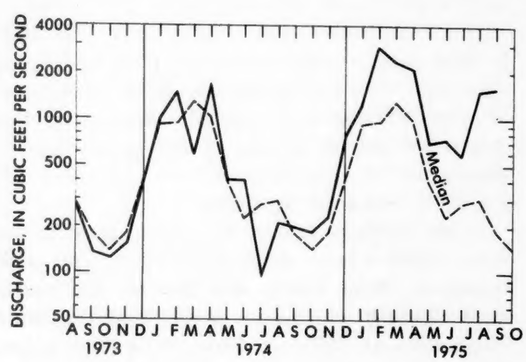
[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW GENERALLY INCREASED EXCEPT IN PARTS OF ALABAMA, GEORGIA, MISSISSIPPI, AND SOUTH CAROLINA. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN PARTS OF ALABAMA, FLORIDA, GEORGIA, MISSISSIPPI, AND VIRGINIA, AND INCREASED INTO THAT RANGE IN KENTUCKY, TENNESSEE, AND WEST VIRGINIA. RECORD-HIGH DAILY AND MONTHLY MEAN DISCHARGES OCCURRED IN WESTERN FLORIDA. FLOODING OCCURRED IN PARTS OF ALABAMA, KENTUCKY, NORTH CAROLINA, TENNESSEE, AND VIRGINIA.

At the index station, Shoal River near Crestview (drainage area, 474 square miles), in northwestern Florida, high carryover flow from August, augmented by runoff from rains associated with hurricane Eloise, resulted in a monthly mean discharge of 3,990 cfs and a daily mean of 18,200 cfs on the 25th, which were highest for September since records began in July 1938. Record-high monthly and daily mean discharges occurred at this station also in August. Also in the northern part of Florida the discharge of Silver Springs increased 10 cfs, to 650 cfs; 78 percent of normal. In west-central Florida, monthly mean discharge of Peace River at Arcadia increased seasonally and remained in the normal range but was less than median for the 13th consecutive month. In the southeastern part of the State, flow of Miami Canal at Miami increased 100 cfs, to 250 cfs; 63 percent of normal. In southwestern Florida, flow southward through the Tamiami Canal outlets, 40-mile bend to Monroe, increased seasonally 377 cfs; to 531 cfs; 98 percent of normal.

In western North Carolina, minor flooding occurred in the upper French Broad River basin September 18, and more extensive flooding occurred in the basins of Briar Creek, Sugar Creek, and Irwin Creek, in Mecklenburg County, as a result of intense rains on September 23. Peak discharges at the gaging stations, Irwin Creek near Charlotte and Little Sugar Creek near Charlotte, were equivalent to those of 16- and 18-year floods, respectively, and local residents reported that the peak stage on Sugar Creek near Fort Mills, about 15 miles south of Charlotte, was the highest in 20 to 25 years. Also in the western part of the State, the yearly mean discharge for the water year ending September 30 at the index station, South Yadkin River near Mocksville, was above the normal range and the cumulative runoff of 21.15 inches was the 4th highest for any water year since records began in October 1938. In central North Carolina, flow at the index station, Cape Fear River at William O. Huske lock near Tarheel, increased contraseasonally and was 3 times the median flow for the month.

In southern Alabama, high carryover flow from August, augmented by runoff from rains associated with hurricane Eloise, resulted in a contraseasonal increase in monthly mean flow at the index station, Conecuh River at Brantley (see graph), and minor flooding along small



Monthly mean discharge of Conecuh River at Brantley, Ala. (Drainage area, 492 sq mi; 1,274 sq km)

streams in the path of the storm. In the northern part of the State, high carryover flow from August assisted in holding monthly mean flows in the above-normal range.

In Tennessee, runoff from above-normal rainfall resulted in contraseasonal increases in flow and monthly mean discharges that were above the normal range at all index stations in the State. Bankfull stages were common and minor overflow occurred on the flood plains of some streams. In the eastern part of the State, monthly mean discharge at the index station Emory River at Oakdale increased from near median in August to 20 times median in September.

Similarly, monthly mean discharges at all index stations in Kentucky increased contraseasonally and were above the normal range, and minor flooding occurred along some streams, as a result of rains associated with hurricane (tropical storm) Eloise. In the northern part of the State for example, monthly mean discharge of Licking River at Catawba increased sharply from near median during August to 16 times median during September.

Also in West Virginia and Virginia, flows increased contraseasonally at all index stations during the rains associated with tropical storm Eloise near monthend, and monthly mean discharges were above the normal range. Damaging floods occurred in parts of northern Virginia but peak stages and discharges generally were lower than those resulting from runoff during tropical storm Agnes in June 1972. Selected data on stages, discharges, and gaging-station locations, including the Potomac River near Washington, D.C; are given on the table and map on pages 4 and 5.

Ground-water levels generally rose in water-table wells in northern West Virginia, in Kentucky, and in northern and southeastern Florida; but declined slightly in the Piedmont of Georgia, and declined also in most of Alabama. In deeper aquifers in Kentucky, levels generally declined. In the artesian aquifer in Bibb County in west-central Alabama, the level rose in the key observation well and was highest for end of September in the 23 years of record. In Georgia, in and near the heavily pumped coastal areas of Brunswick and Savannah, levels were about the same as or only slightly higher than those of a month ago but were significantly higher than those of a year ago, attributable to a reduction in industrial pumpage. In southeastern Florida, monthend levels were from 0.5 to 2.0 feet below average for this time of year.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

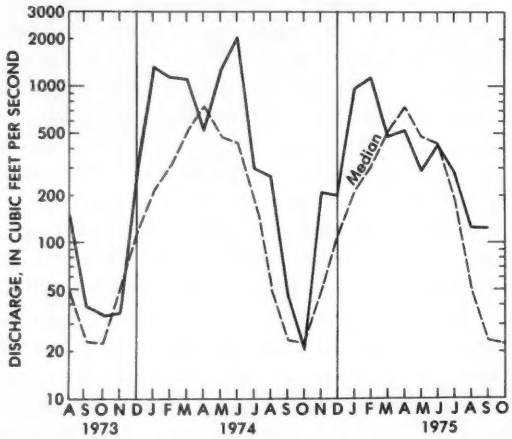
STREAMFLOW INCREASED CONTRASEASONALLY AND WAS ABOVE THE NORMAL RANGE IN CENTRAL AND SOUTHEASTERN PARTS OF THE REGION, BUT DECREASED AT SOME INDEX STATIONS IN NORTHERN, WESTERN, AND SOUTH-CENTRAL PARTS. FLOWS REMAINED BELOW THE NORMAL RANGE IN PARTS OF MINNESOTA AND ONTARIO, AND ABOVE THAT RANGE IN PARTS OF ILLINOIS, MICHIGAN, AND ONTARIO. FLOODING OCCURRED IN MICHIGAN AND OHIO AND RECORD-HIGH DAILY AND MONTHLY MEAN DISCHARGES OCCURRED IN PARTS OF MICHIGAN.

Rapid runoff from intense rainfall, August 31–September 1, in and near Cleveland, Ohio, resulted in flooding along Euclid Creek in the eastern part of that city. Mud slides and small-stream flooding occurred also September 1 near Bellaire, in eastern Ohio, and near Wheeling in the adjacent area of West Virginia. In southeastern Ohio, minor flooding occurred September 25 as a result of runoff from intense rains associated with tropical storm Eloise. At the index station, Little Beaver Creek near East Liverpool, Ohio, in the east-central part of the State, monthly mean discharge increased sharply and was 14 times the median flow for September as a result of high carryover flow from August, augmented by runoff from several storms during the month. Monthly mean flow increased sharply also at the index station, Scioto River at Higby, in south-central Ohio, and was 5 times the September median flow.

In the northern part of Michigan's Lower Peninsula, extensive flooding occurred September 1 on the flood plains of White River. The National Weather Service reported rainfall of 6 inches in 24 hours, August 31–September 1, at an observation point in the headwaters area of that basin. The resulting peak discharge at the gaging station, White River near Whitehall (drainage area, 380 square miles) was 5,400 cfs, the greatest discharge observed there since records began in August 1957. In the southern part of the Lower Peninsula, high carryover flow from August, augmented by runoff from the storm of August 31–September 1, resulted in a monthly mean discharge of 281 cfs at the index station, Red Cedar River at East Lansing (drainage area, 355 square miles), highest for September since records began in 1938, one and one-half times the previous maximum monthly mean discharge for September (1947) and 8 times the September median flow.

In western Indiana and the adjacent area of eastern Illinois, flow in the Wabash River basin increased contraseasonally and monthly mean discharge at the index station, Wabash River at Mt. Carmel, Illinois, was twice the September median

and in the above-normal range. Also in eastern Illinois, high carryover flow from August, augmented by runoff from locally heavy thunderstorms, retarded the normal seasonal decline in streamflow at the index station, Sangamon River at Monticello, where monthly mean discharge was 5 times the median flow for September (see graph).



Monthly mean discharge of Sangamon River at Monticello, Ill. (Drainage area, 550 sq mi; 1,424 sq km)

In Wisconsin, monthly mean flows increased into the above-normal range in the Fox and Wisconsin River basins. Monthly mean discharge of Fox River at Rapide Croche Dam near Wrightstown, in eastern Wisconsin, increased sharply from the below-normal range in August into the above-normal range during September. In the western part of the State, monthly mean flow of Wisconsin River at Muscoda also increased sharply, was 76 percent greater than the mean flow in August, and was above the normal range.

In central Minnesota, monthly mean flow of Crow River at Rockford increased contraseasonally but remained in the normal range. Elsewhere in the State, flows generally decreased seasonally, and in southwestern Minnesota, monthly mean discharge of Minnesota River near Jordan remained in the below-normal range and was only 45 percent of median for the 2d consecutive month.

In southern Ontario, monthly mean flows remained below the normal range, and less than one-half of the respective median flows, at the index stations, English River at Umfreville in the southwest, and Missinaibi River at Mattice in the eastern part of the Province. In the extreme southeastern part, monthly mean flows increased seasonally and were above the normal range in North Magnetawan River near Burk's Falls and Saugeen River near Port Elgin.

Ground-water levels rose in most of the region, but declined in southern Minnesota and in Michigan's Upper Peninsula. In the Lower Peninsula, monthend levels were highest of record for September in some areas, and levels were above average also in Ohio; and were below average in Minnesota. In heavily pumped aquifers, levels declined in the Milwaukee, Wis., area; and rose in the artesian aquifers in the Minneapolis St. Paul, Minn., area.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

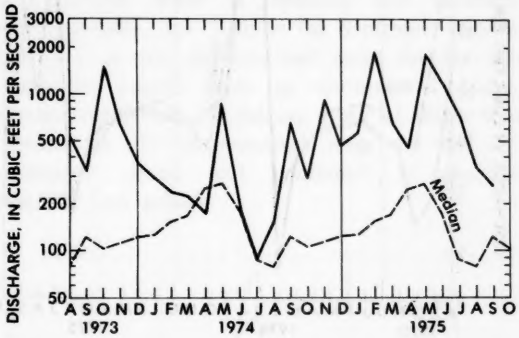
STREAMFLOW INCREASED CONTRASEASONALLY IN PARTS OF ARKANSAS, MISSOURI, AND SOUTH DAKOTA, AND DECREASED IN ALL OTHER PARTS OF THE REGION. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN PARTS OF ARKANSAS, LOUISIANA, AND NORTH DAKOTA, AND INCREASED INTO THAT RANGE IN MISSOURI. FLOWS DECREASED INTO THE BELOW-NORMAL RANGE IN PARTS OF KANSAS, NEBRASKA, AND TEXAS. FLOODING OCCURRED IN MISSOURI, OKLAHOMA, AND TEXAS.

In Missouri, minor flooding occurred on the flood plains of many streams as a result of runoff from numerous thunderstorms. In the northwestern part of the State, where mean flow of Grand River near Gallatin was about one-fourth of median in August, flow increased sharply and the monthly mean discharge in September was above the normal range and about 5 times median for the month. Flow in Gasconade River at Jerome, in southern Missouri, also increased contraseasonally into the above-normal range and was 3 times the September median discharge.

In northeastern Oklahoma, rapid runoff from locally heavy rainfall resulted in major flooding along streams in and near Pryor, about 35 miles northeast of Tulsa, on September 19. In the southwestern part of the State, where monthly mean discharges at the index station, Washita River near Durwood, were 3, 5, and 7 times the respective median discharges during June, July and August, flow decreased contraseasonally in September and monthly mean discharge was in the normal range.

In the lower Rio Grande valley in southwestern Texas, moderate flooding occurred during the first week of September as a result of runoff from intense rainfall

associated with hurricane Caroline. In west-central Texas, flow ceased in North Conchos River near Carlsbad on August 25 and had not resumed on September 30. In the south-central part of the State, where monthly mean flow of Guadalupe River near Spring Branch was above the normal range continuously from November 1974 through August 1975, flow decreased contraseasonally in September and monthly mean discharge was 3 times the September median but was in the normal range (see graph).



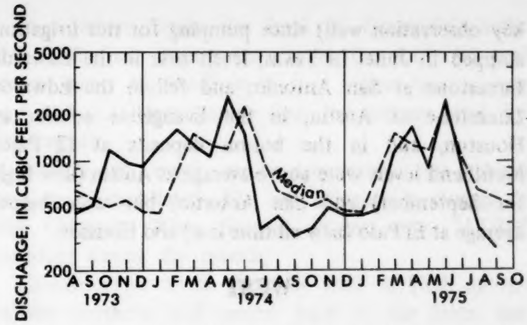
Monthly mean discharge of Guadalupe River near Spring Branch, Texas (Drainage area, 1,315 sq mi; 3,406 sq km)

In Louisiana, monthly mean flows at all index stations decreased seasonally but remained in the above-normal range for the 5th consecutive month. In the southeastern part of the State, the monthly mean discharge of 3,121 cfs in Amite River near Denham Springs (drainage area, 1,280 square miles) was highest for September in record that began in October 1938, and was 5 times the September median flow.

In northern Arkansas, where monthly mean discharge of Buffalo River near St. Joe was less than median during the past 5 months, flow increased contraseasonally into the above-normal range in September. In the southern part of the State, where monthly mean flow of Saline River near Rye was in the above-normal range in 3 of the past 5 months, flow decreased seasonally and was in the normal range in September.

In northwestern Nebraska, monthly mean discharge of Niobrara River above Box Butte Reservoir remained at about one-half the monthly median flow for the 4th consecutive month and was below the normal range. In the northeastern part of the State, monthly mean flow of Elkhorn River at Waterloo remained in the below-normal range for the 2d consecutive month, and was less than median for the 3d consecutive month (see graph).

In eastern North Dakota, monthly mean flow of Red River of the North at Grand Forks remained in the



Monthly mean discharge of Elkhorn River at Waterloo, Nebr. (Drainage area, 6,900 sq mi; 17,900 sq km)

above-normal range for the 10th time during the past 12 months, as a result of high carryover flow from August in the southern tributaries. Streamflow in the western Canadian-border area of the State was above average as a result of runoff from 4 to 6 inches of rain at midmonth.

In the Bad River basin in central South Dakota, where no flow occurred during August, runoff from rains at midmonth in September resulted in a monthly mean discharge of 2.24 cfs at the index station near Fort Pierre (drainage area, 3,107 square miles) which was 6 times the September median flow but was in the normal range.

In south-central Manitoba, monthly mean discharge of Waterhen River below Waterhen Lake continued to decrease seasonally but was above the normal range for the 10th time in the past 12 months. Also in the south-central part of the Province, the level of Lake Winnipeg at Gimli averaged 716.36 feet above mean sea level, 2.54 feet higher than the September long-term mean, 0.50 foot lower than last month, and 0.89 foot lower than a year ago.

Ground-water levels declined, at least slightly, in Kansas, Nebraska, North Dakota, and northern Iowa. Levels rose in southern Iowa. Monthend levels were below average in Nebraska, except in the northwestern part of the State. Levels were near or above average in Iowa (except in the extreme southwest) and in northwestern and southeastern North Dakota. In the rice-growing area of east-central Arkansas, the level in the shallow aquifer (Quaternary deposits) was unchanged and was in the same range of values for September that have prevailed since 1960. In the industrial aquifer of central and southern Arkansas (Sparta Sand), levels rose in the key wells at Pine Bluff (lowest September level of record) and El Dorado. In Louisiana, levels rose in the terrace aquifer in the central part of the State, reflecting above-average rainfall; and continued rising in the Chicot aquifer in the southwest—a recovery of 20 feet (in the

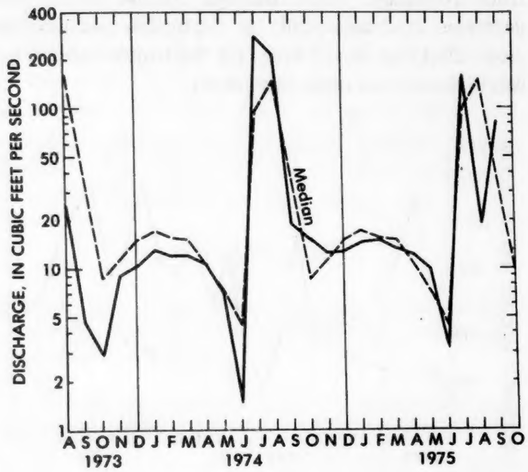
key observation well) since pumping for rice irrigation stopped in June. In Texas, levels rose in the Edwards Limestone at San Antonio; and fell in the Edwards Limestone at Austin, in the Evangeline aquifer at Houston, and in the bolson deposits at El Paso. Monthend levels were above average at Austin (new high for September) and San Antonio; but were below average at El Paso (new all-time low) and Houston.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

STREAMFLOW GENERALLY DECREASED SEASONALLY EXCEPT IN PARTS OF ARIZONA, BRITISH COLUMBIA, IDAHO, AND NEW MEXICO, WHERE FLOWS INCREASED CONTRASEASONALLY AND WERE IN THE ABOVE-NORMAL RANGE. FLOWS REMAINED ABOVE THE NORMAL RANGE IN PARTS OF SOME NORTHERN AND CENTRAL STATES OF THE REGION AND DECREASED INTO THE BELOW-NORMAL RANGE IN SOUTHWESTERN UTAH. RECORD-HIGH MONTHLY MEAN DISCHARGES OCCURRED IN ARIZONA AND NEW MEXICO.

In Arizona and New Mexico, runoff early in the month from rains associated with hurricanes along the Gulf coast contributed to contraseasonal increases in monthly mean discharge at all index stations, and record-high monthly mean discharges occurred in Gila River basin in those two States. In southeastern Arizona, the monthly mean flow of 2,080 cfs at the index station, Gila River at head of Safford Valley, near Solomon (drainage area, 7,896 square miles) was highest for September in 61 years of record, 8 times the September median flow and 28 percent greater than the previous September maximum monthly mean discharge of 1,630 cfs, which occurred in 1925. The peak discharge at this site during this period of high runoff was 35,000 cfs on September 9, less than one-half of the most recent significant peak flow, which occurred October 20, 1972. Upstream, at the index station, Gila River near Gila, New Mexico (drainage area, 1,864 square miles) the monthly mean flow of 974 cfs was highest for the month in 48 years of record, 13 times median, and also 28 percent greater than the previous September maximum monthly mean of 762 cfs, which occurred in 1941. In San Pedro River basin in extreme southeastern Arizona, where monthly mean flow in August at the index station at Charleston (drainage area, 1,219 square miles) was below the normal range and only 8 percent of median, flow also increased contraseasonally in September and the monthly mean discharge of 82.2 cfs was about 3 times median for the month (see graph). In northeastern New Mexico,



Monthly mean discharge of San Pedro River at Charleston, Ariz. (Drainage area, 1,219 sq km; 3,157 sq km)

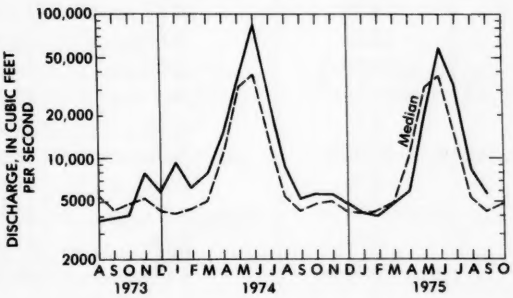
monthly mean flow of Rayado Creek at Sauble Ranch, near Cimarron, also increased contraseasonally into the above-normal range, and was 3 times the median discharge for September.

In the central part of the region, in parts of northern Colorado, northern Utah, and northern Nevada, where monthly mean flows have been in the above-normal range since June, and were highest of record during June and July at some index stations, high carryover flow from August, augmented by runoff from September rains, held monthly mean flows above the normal range for the 4th consecutive month. In Utah, the sum of the September monthly mean discharges at 7 selected gaging stations was 26 percent greater than the sum of the mean September flows at those stations for the reference period, 1941–70, as compared to 8 percent less than average a year ago. In extreme southwestern Utah, monthly mean discharge of Virgin River, as measured near the Utah-Arizona boundary, at Littlefield, Arizona, decreased seasonally and was in the below-normal range.

In northern California, flow of Sacramento River at Verona increased seasonally, remained in the above-normal range for the 3d consecutive month, and the monthly mean discharge was twice the September median.

In western Oregon, high carryover flows from August held monthly mean flows of Willamette River at Salem and Umpqua River near Elkton in the above-normal range for the 2d and 5th consecutive months, respectively.

In southern Idaho, flow of Snake River at Weiser increased, as the demand for irrigation water upstream from Weiser decreased, and monthly mean discharge was above the normal range. In the north-central part of the State, monthly mean flow of Clearwater River at Spalding also increased contraseasonally, was 3 times the September median flow, and in the above-normal range for the 4th consecutive month. Also in north-central Idaho, monthly mean flow of Salmon River at White Bird remained in the above-normal range for the 4th consecutive month but continued to decrease seasonally (see graph).



Monthly mean discharge of Salmon River at White Bird, Idaho (Drainage area, 13,550 sq mi; 35,090 sq km)

In western Montana, monthly mean discharge of Clark Fork at St. Regis and Middle Fork Flathead River near West Glacier also remained in the above-normal range for the 4th consecutive month. In the south-central part of the State, monthly mean flow of Yellowstone River at Billings (drainage area, 11,795 square miles) decreased seasonally and was in the normal range for September, but as a result of record-high monthly mean runoff at that station in July, the water year annual mean discharge was 10,590 cfs, which is the highest in 47 years of record. The previous water year maximum annual mean discharge at Billings was 10,220 cfs in 1943.

Flows decreased seasonally and were in the normal range in British Columbia except on Vancouver Island where monthly mean discharge of Sproat River near Alberni increased contraseasonally, was 3 times the September median, and was above the normal range.

In northern Utah, the level of Great Salt Lake fell 0.50 foot during the month (to 4,199.95 feet above mean sea level), 0.70 foot higher than a year ago and 2.35 feet higher than the average level for September.

Storage in most major reservoirs was above average at monthend. The net decrease in storage in the Colorado River Storage Project was 712,710 acre-feet during the month.

Ground-water levels generally rose in Utah except in the northern and central parts of the State; and rose or stayed about the same in much of Idaho. Levels changed only slightly in southern New Mexico except for rises in key observation wells near Deming and Roswell. Levels generally declined in Montana and Nevada. Monthend levels were mostly above average in Montana (except in intermontane basins west of the Continental Divide) and in northern Idaho and in the Snake Plain aquifer of southern Idaho, except for below-average levels in the Rupert-Minidoka area. In Nevada, levels were above-average in the north-central part (Paradise well) and the east-central part (Steptoe well) of the State. Monthend levels were below average in southern New Mexico and in Utah except in the northeast (Logan well) and southeast (Blanding well). In southern Arizona, monthend levels were highest for September in 25 years of record in the key well at head of Safford Valley, Graham County (540-foot well, tapping the Gila Conglomerate); and were lowest of record for the month in the Tucson No. 2, Elfrida, and Avra Valley observation wells.

ALASKA

Streamflow increased in the south-central part of the State as a result of runoff from above-normal rainfall. Monthly mean flow of Little Susitna River near Palmer increased contraseasonally and was in the above-normal range, and the peak discharge of 4,770 cfs, September 11, on Power Creek near Cordova, was 3d highest in 28 years of record. Minor peaks occurred on other streams in this part of the State. In east-central Alaska, monthly mean flow of Tanana River at Nenana decreased seasonally but was in the above-normal range.

Ground-water levels rose in the Anchorage area both in the confined and in the water-table aquifers. In the latter, the rises resulted from recharge following above-average precipitation.

HAWAII

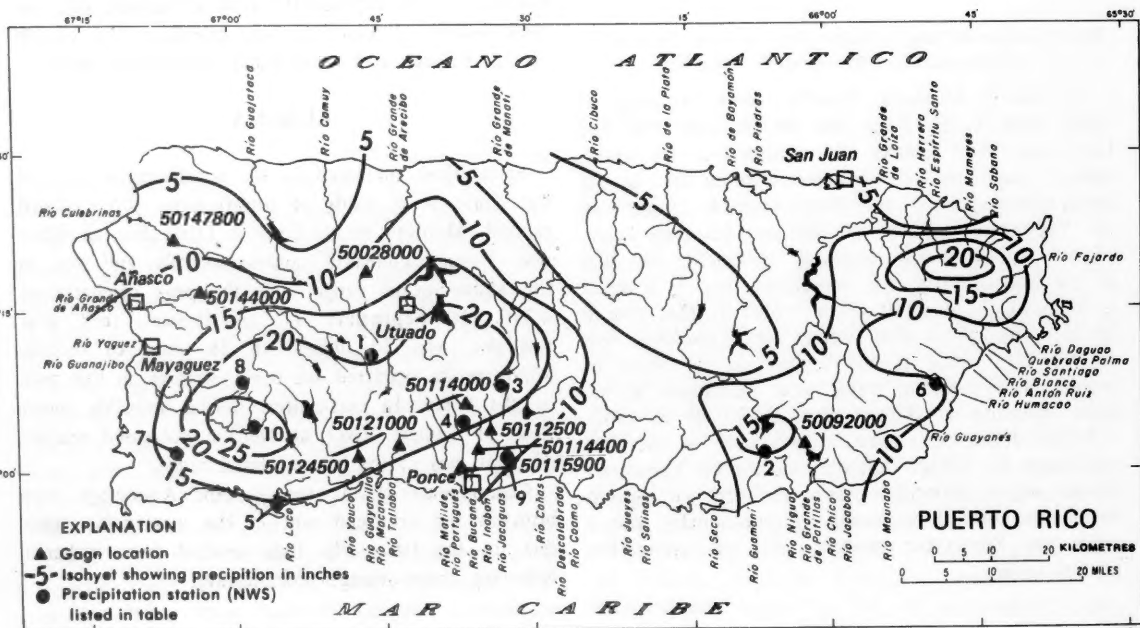
Streamflow decreased seasonally and was below the normal range at all index stations in the State. The monthly mean discharge of 0.39 cfs, and the daily mean of 0.24 cfs September 24–26, in Kalihi Stream near Honolulu, in the southern part of the island of Oahu, were lowest for September since records began at that station in September 1913. Monthly mean flows at the index stations on the islands of Hawaii, Kauai, and Oahu remained in the below-normal range for the 4th consecutive month.

PUERTO RICO

Tropical storm Eloise passed Puerto Rico September 15–17, 1975, leaving in its wake severe flooding resulting in 34 deaths, over $60 million damages, and more than 10,000 persons in shelters. The National Weather Service in San Juan, Puerto Rico, furnished the preliminary precipitation data for the 10 stations in the table. The accompanying map shows three-day precipitation totals by isohyetal lines (isohyets by NWS).

The hardest hit part of the Island was in the southwest, extending from Ponce to Mayaguez. Also severely hit was the town of Utuado in the west-central mountains of Puerto Rico. Preliminary estimates of discharge and recurrence intervals for selected streams are listed in the table of stages and discharges. Station locations are shown on the map.

Number on map	*Location*	*Precipitation, in inches* *September 15*	*September 16*	*September 17*	*Total*
1	Adjuntas Substation	0.15	11.99	4.87	17.01
2	Carite Plant No. 1	.05	10.05	6.85	16.95
3	Cerro Maravilla	.46	16.00	2.37	18.83
4	Corral Viejo	.10	7.58	8.26	15.94
5	Ensenada	.05	5.41	10.30	15.76
6	Humacao	.40	8.02	5.22	13.64
7	Lajas Substation	.29	3.10	12.26	15.65
8	Maricao 2 SSW	2.32	6.05	14.10	22.47
9	Ponce 4 E	0	2.90	7.78	10.68
10	Sabana Grande 2 ENE	1.20	14.00	11.50	26.70



Map of Puerto Rico showing isohyets for storm of September 15–17, 1975, and locations of selected precipitation and stream-gaging stations

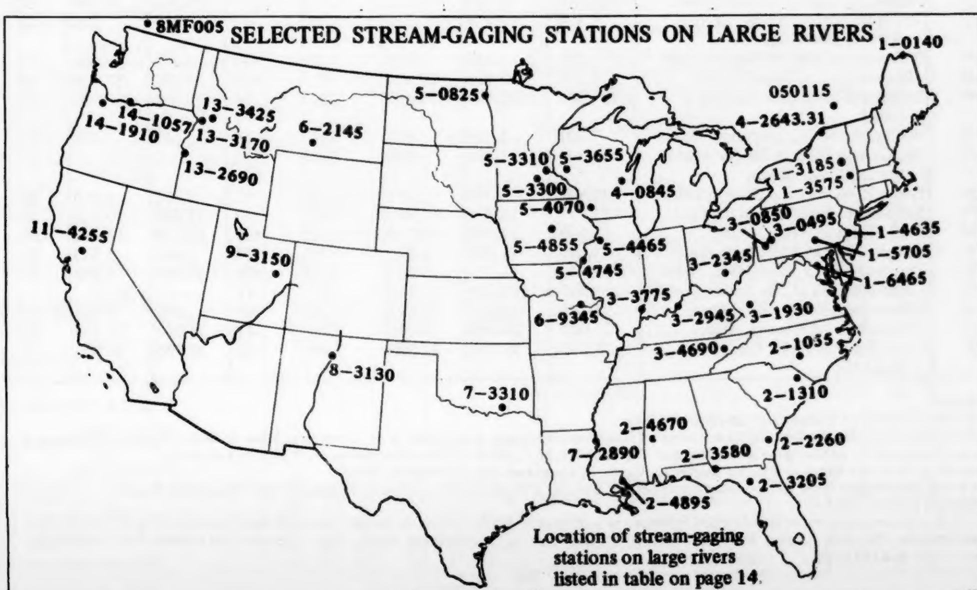
Provisional data; subject to revision

STAGES AND DISCHARGES FOR THE FLOOD OF SEPTEMBER 1975 IN PUERTO RICO

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge: Cfs	Discharge: Cfs per square mile	Recurrence interval (years)
RIO GRANDE DE ARECIBO BASIN											
50028000	Río Tanama near Utuado.	18.4	1959–75	May 17, 1963	13.29	8,950	Sept. 16	12.99	8,650	470	15
RIO GRANDE DE PATILLAS BASIN											
50092000	Río Grande de Patillas near Patillas.	18.3	1966–75	Oct. 7, 1970	11.45	11,200	16	12.41	15,000	820	[a]60
RIO INABON BASIN											
50112500	Río Inabón at Real Abajo.	9.70	1964–75	Oct. 9, 1970	26.0	8,450	16	18.6	7,000	722	10
RIO BUCANA BASIN											
50114000	Río Cerrillos near Ponce . .	17.8	1964–75	Oct. 9, 1970	8.70	9,140	16	11.56	14,000	787	>50
50114400	Río Bucana near Ponce . . .	25.6	1965–75	Oct. 9, 1970	14.2	12,000	16	19.1	20,000	781	>50
RIO PORTUGUES BASIN											
50115900	Río Portugués at Ponce . . .	18.6	1965–75	Nov. 10, 1970	13.32	5,880	16	17.4	11,500	618	30
RIO TALLABOA BASIN											
50121000	Río Tallaboa at Peñuelas .	24.2	1959–75	. . . .	. . . . . .	. . . . .	16	11.6	25,000	1,033	[a]100
RIO GUAYANILLA BASIN											
50124500	Río Guayanilla at Guayanilla.	20.8	1970–75	Oct. 8, 1970	7.46	4,530	16	15.8	34,000	1,635	[a]100
RIO GRANDE DE ANASCO BASIN											
50144000	Río Grande de Añasco near San Sebastián.	94.3	1963–75	Oct. 26, 1971	19.61	20,300	16	37.8	68,000	721	[a]100
RIO CULEBRINAS BASIN											
50147800	Río Culebrinas near Moca.	71.2	1967–75	Oct. 21, 1972	29.58	33,800	16	36.7	67,000	941	[a]100

[a]About.

SELECTED STREAM-GAGING STATIONS ON LARGE RIVERS



Location of stream-gaging stations on large rivers listed in table on page 14.

FLOW OF LARGE RIVERS DURING SEPTEMBER 1975

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	September 1975: Monthly discharge (cfs)	September 1975: Percent of median monthly discharge, 1941–70	September 1975: Change in discharge from previous month (percent)	Discharge near end of month (cfs)	Discharge near end of month (mgd)	Discharge near end of month: Date
1–0140	St. John River below Fish River at Fort Kent, Maine.	5,690	9,397	3,113	93	+19	5,000	3,200	30
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	2,754	252	+372	6,000	3,880	30
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	6,200	387	+295	....	....	.....
1–4635	Delaware River at Trenton, N.J	6,780	11,360	12,110	290	+86	35,900	23,200	28
1–5705	Susquehanna River at Harrisburg, Pa.	24,100	33,670	73,930	1,256	+762	212,000	137,000	30
1–6465	Potomac River near Washington, D.C.	11,560	[1] 10,640	25,500	960	+423	32,000	21,000	30
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	4,847	5,460	299	+158	12,500	8,100	30
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	9,650	204	+33	27,300	17,600	29
2–2260	Altamaha River at Doctortown, Ga.	13,600	13,380	8,768	179	-45	10,900	7,000	26
2–3205	Suwannee River at Branford, Fla	7,740	6,775	6,870	123	-27	6,580	4,250	29
2–3580	Apalachicola River at Chattahoochee, Fla.	17,200	21,690	16,600	136	-44	12,700	8,200	29
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	21,700	7,107	218	-57	17,200	11,100	25
2–4895	Pearl River near Bogalusa, La	6,630	8,533	4,510	199	-73	3,060	1,980	30
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 18,700	18,780	687	+309	26,700	17,300	26
3–0850	Monongahela River at Braddock, Pa.	7,337	[1] 11,950	12,520	419	+68	16,300	10,500	26
3–1930	Kanawha River at Kanawha Falls, W.Va.	8,367	12,370	9,681	303	+160	14,000	9,000	30
3–2345	Scioto River at Higby, Ohio	5,131	4,337	2,896	481	+168	4,870	3,150	26
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	91,700	485	+164	244,500	158,000	26
3–3775	Wabash River at Mount Carmel, Ill.	28,600	26,310	12,340	194	+25	7,500	4,850	30
3–4690	French Broad River below Douglas Dam, Tenn.	4,543	[1] 6,528	5,466	204	+65	....	....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,142	3,500	163	+112	....	....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	239,100	281,400	116	-1	282,000	182,000	30
050115	St. Maurice River at Grand Mere, Quebec.	16,300	24,900	20,300	118	+56	18,800	12,200	29
5–0825	Red River of the North at Grand Forks N. Dak.	30,100	2,439	2,125	156	-28	2,070	1,340	30
5–3300	Minnesota River near Jordan, Minn	16,200	3,306	503	45	-39	435	280	29
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,230	6,284	99	-12	6,090	3,940	28
5–3655	Chippewa River at Chippewa Falls, Wis.	5,600	5,062	3,739	124	+82	....	....	.....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	7,923	136	+76	....	....	.....
5–4465	Rock River near Joslin, Ill	9,520	5,288	3,682	143	-3	2,620	1,700	30
5–4745	Mississippi River at Keokuk, Iowa	119,000	61,210	....	....	....	39,700	25,700	30
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa.	9,879	3,796	832	79	-42	505	325	30
6–2145	Yellowstone River at Billings, Mont.	11,795	6,754	5,076	127	-44	4,700	3,000	30
6–9345	Missouri River at Hermann, Mo	528,200	78,480	92,860	177	+21	79,100	51,100	30
7–2890	Mississippi River near Vicksburg, Miss.[4]	1,144,500	552,700	374,400	151	+6	438,000	283,000	29
7–3310	Washita River near Durwood, Okla	7,202	1,379	812	160	-66	600	390	30
8–3130	Rio Grande at Otowi Bridge, near San Ildefonso, N.Mex.	14,300	1,530	926	188	+20	....	....	.....
9–3150	Green River at Green River, Utah	40,600	6,369	2,117	92	-55	2,330	1,510	26
11–4255	Sacramento River at Verona, Calif	21,257	18,370	18,300	187	+8	15,800	10,200	26
13–2690	Snake River at Weiser, Idaho	69,200	17,670	14,000	111	+23	15,600	10,100	25
13–3170	Salmon River at White Bird, Idaho	13,550	11,060	5,670	129	-34	5,100	3,300	25
13–3425	Clearwater River at Spalding, Idaho	9,570	15,320	10,550	348	+54	10,500	6,800	25
14–1057	Columbia River at The Dalles, Oreg.[5]	237,000	194,000	111,100	106	-11	....	....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,370	11,560	176	+47	12,160	7,860	26–30
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	37,400	[6] 120	-41	30,000	19,000	30
8MF005	Fraser River at Hope, British Columbia.	78,300	95,300	82,500	99	-33	59,900	38,700	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
[6] Reference period, 1963–74.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF SEPTEMBER 1975

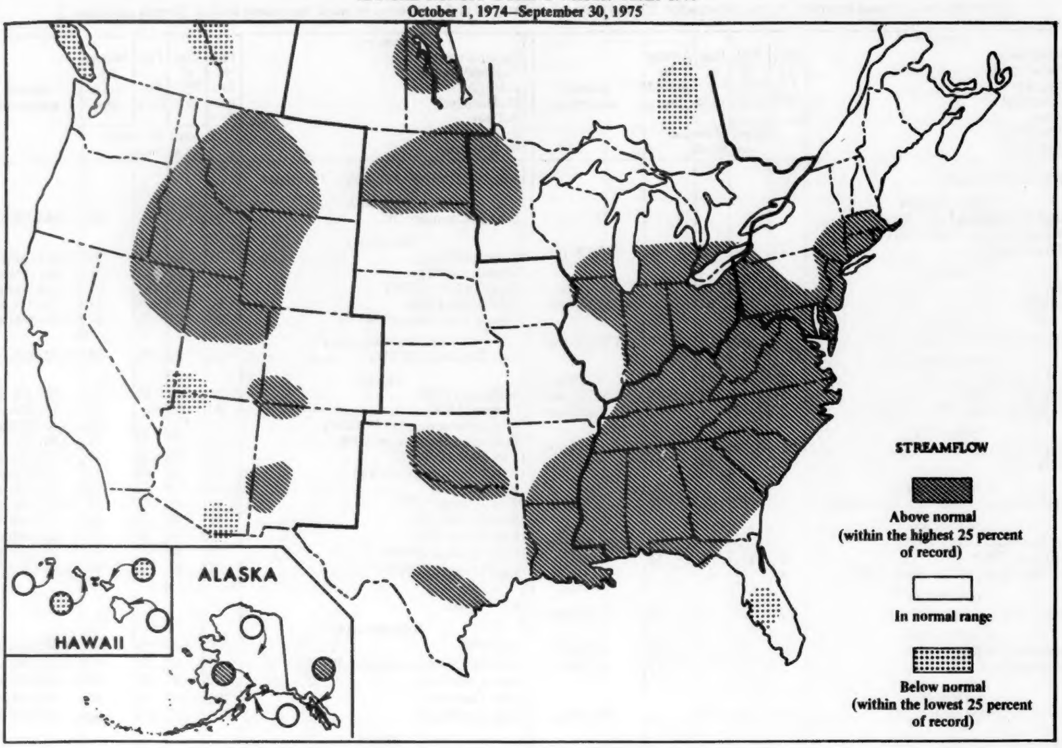
[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Aug. 1975	End of Sept. 1975	End of Sept. 1974	Average for end of Sept.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	47	31	38	38	223,400 (a)
QUEBEC					
Allard (P)	82	84	72	91	280,600 ac-ft
Gouin (P)	76	79	85	102	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	64	53	64	66	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	88	83	74	79	3,330 mcf
Lake Francis (FPR)	81	95	84	77	4,326 mcf
Lake Winnipesaukee (PR)	87	82	79	62	7,200 mcf
VERMONT					
Harriman (P)	75	78	70	63	5,060 mcf
Somerset (P)	86	92	79	71	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	83	87	70	74	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	73	84	64	62	34,270 mcf
Indian Lake (FMP)	102	111	95	56	4,500 mcf
New York City reservoir system (MW)	91	91	84	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	100	101	67	68	27,730 mg
PENNSYLVANIA					
Pymatuning (FMR)	93	94	93	80	8,191 mcf
Wallenpaupack (P)	67	66	60	55	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	99	102	94	85	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	87	100	94	81	12,580 mcf
Narrows (Badin Lake) (P)	93	97	95	98	5,617 mcf
High Rock Lake (P)	82	45	69	64	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	82	79	76	65	70,300 mcf
Lakes Marion and Moultrie (P)	84	85	82	64	81,100 mcf
SOUTH CAROLINA––GEORGIA					
Clark Hill (FP)	79	78	75	54	75,360 mcf
GEORGIA					
Burton (PR)	88	88	89	77	104,000 ac-ft
Sinclair (MPR)	88	93	76	80	214,000 ac-ft
Lake Sidney Lanier (FMPR)	63	64	63	54	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	96	94	84	75	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	41	34	39	38	1,156,000 cfsd
Douglas Lake (FPR)	28	30	35	33	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	59	53	61	58	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	49	44	56	44	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	50	46	58	58	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	75	73	85	73	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	48	58	71	63	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	41	34	35	32	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	102	97	95	95	22,640,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	65	60	60	74	127,600 ac-ft
Bell Fourche (I)	38	26	21	32	185,200 ac-ft
Lake Francis Case (FIP)	76	67	74	67	4,834,000 ac-ft
Lake Oahe (FIP)	99	94	78	.....	22,530,000 ac-ft
Lake Sharpe (FIP)	99	100	102	98	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	95	96	98	98	477,000 ac-ft
MIDCONTINENT REGION––Continued					
NEBRASKA					
Lake McConaughy (IP)	70	67	66	66	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	93	89	98	79	2,378,000 ac-ft
Keystone (FPR)	93	76	105	102	661,000 ac-ft
Tenkiller Ferry (FPR)	102	107	111	87	628,200 ac-ft
Lake Altus (FIMR)	96	89	30	44	134,500 ac-ft
Lake O'The Cherokees (FPR)	84	81	88	81	1,492,000 ac-ft
OKLAHOMA––TEXAS					
Lake Texoma (FMPRW)	100	98	98	92	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	100	99	34	42	386,400 ac-ft
Canyon (FMR)	94	90	...	65	385,600 ac-ft
International Amistad (FIMPW)	100	100	...	68	3,497,000 ac-ft
International Falcon (FIMPW)	89	89	73	72	2,667,000 ac-ft
Livingston (IMW)	99	99	100	68	1,788,000 ac-ft
Possum Kingdom (IMPRW)	95	93	90	102	569,400 ac-ft
Red Bluff (PI)	43	38	31	24	307,000 ac-ft
Toledo Bend (IMPW)	92	85	85	78	4,472,000 ac-ft
Twin Buttes (FIM)	95	94	75	10	177,800 ac-ft
Lake Kemp (IMW)	80	84	43	87	268,000 ac-ft
Lake Meredith (FMW)	48	48	47	42	821,300 ac-ft
Lake Travis (FIMPRW)	91	91	100	75	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	100	98	99	.....	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	99	95	98	97	5,232,000 ac-ft
Lake Chelan (PR)	99	90	92	84	676,100 ac-ft
Lake Cushman (P)	101	96	97	91	359,500 ac-ft
Lake Merwin (P)	106	102	106	92	246,000 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	68	51	54	47	1,235,000 ac-ft
Coeur d'Alene Lake (P)	100	95	80	62	238,500 ac-ft
Pend Oreille Lake (FP)	100	87	88	92	1,561,000 ac-ft
IDAHO––WYOMING					
Upper Snake River (7 reservoirs) (MP)	70	61	56	49	4,282,000 ac-ft
WYOMING					
Boysen (FIP)	94	91	87	84	802,000 ac-ft
Buffalo Bill (IP)	90	75	77	81	421,300 ac-ft
Keyhole (F)	72	69	70	40	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	67	60	59	39	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	0	0	0	14	364,400 ac-ft
Taylor Park (IR)	98	88	72	58	106,200 ac-ft
Colorado–Big Thompson project (I)	82	75	72	59	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	85	83	74	.....	31,280,000 ac-ft
UTAH––IDAHO					
Bear Lake (IPR)	91	86	78	57	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	80	78	79	59	1,000,000 ac-ft
Hetch Hetchy (MP)	87	75	78	58	360,400 ac-ft
Isabella (FIR)	37	32	52	26	551,800 ac-ft
Pine Flat (FI)	43	36	47	36	1,014,000 ac-ft
Clair Engle Lake (Lewiston) (P)	90	84	83	77	2,438,000 ac-ft
Lake Almanor (P)	91	88	94	49	1,036,000 ac-ft
Lake Berryessa (FIMW)	89	87	88	79	1,600,000 ac-ft
Millerton Lake (FI)	35	32	28	33	503,200 ac-ft
Shasta Lake (FIPR)	86	82	84	68	4,377,000 ac-ft
CALIFORNIA––NEVADA					
Lake Tahoe (IPR)	85	80	78	55	744,600 ac-ft
NEVADA					
Rye Patch (I)	105	90	67	.....	157,200 ac-ft
ARIZONA––NEVADA					
Lake Mead and Lake Mohave (FIMP)	76	77	74	70	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	8	13	85	11	1,093,000 ac-ft
Salt and Verde River system (IMPR)	55	52	48	34	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	28	26	38	79	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	19	21	14	22	2,539,000 ac-ft

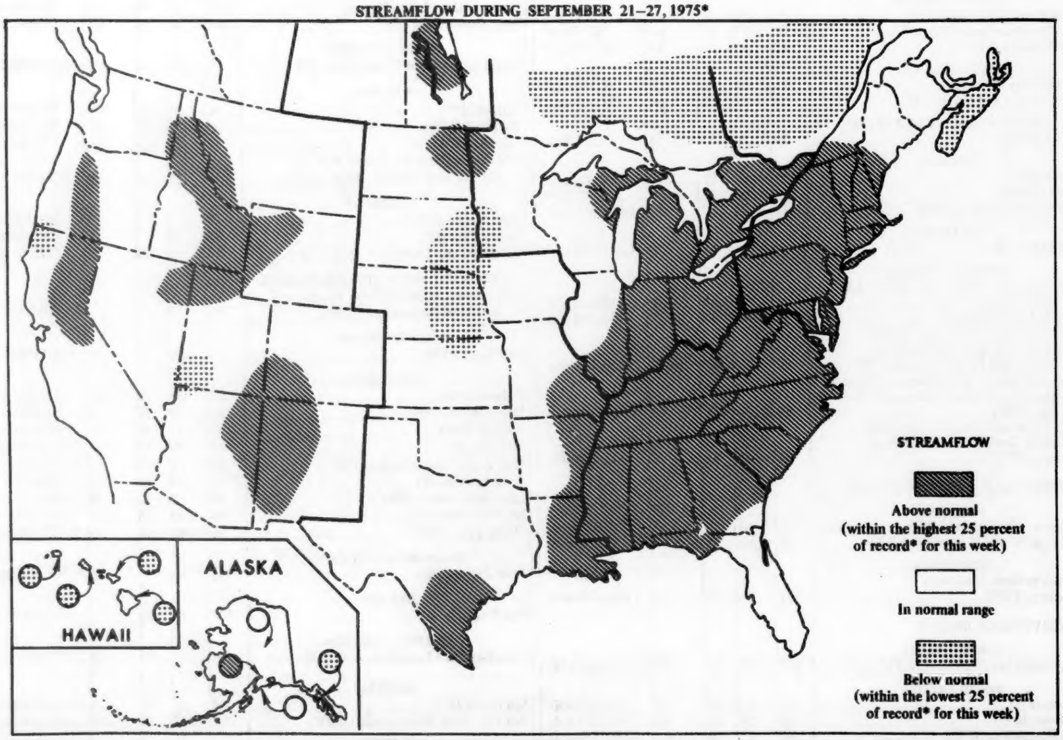
[a] Thousands of kilowatt-hours

STREAMFLOW DURING WATER YEAR 1975 (ANNUAL RUNOFF) AND NEAR END OF WATER YEAR

ANNUAL RUNOFF DURING WATER YEAR 1975
October 1, 1974–September 30, 1975

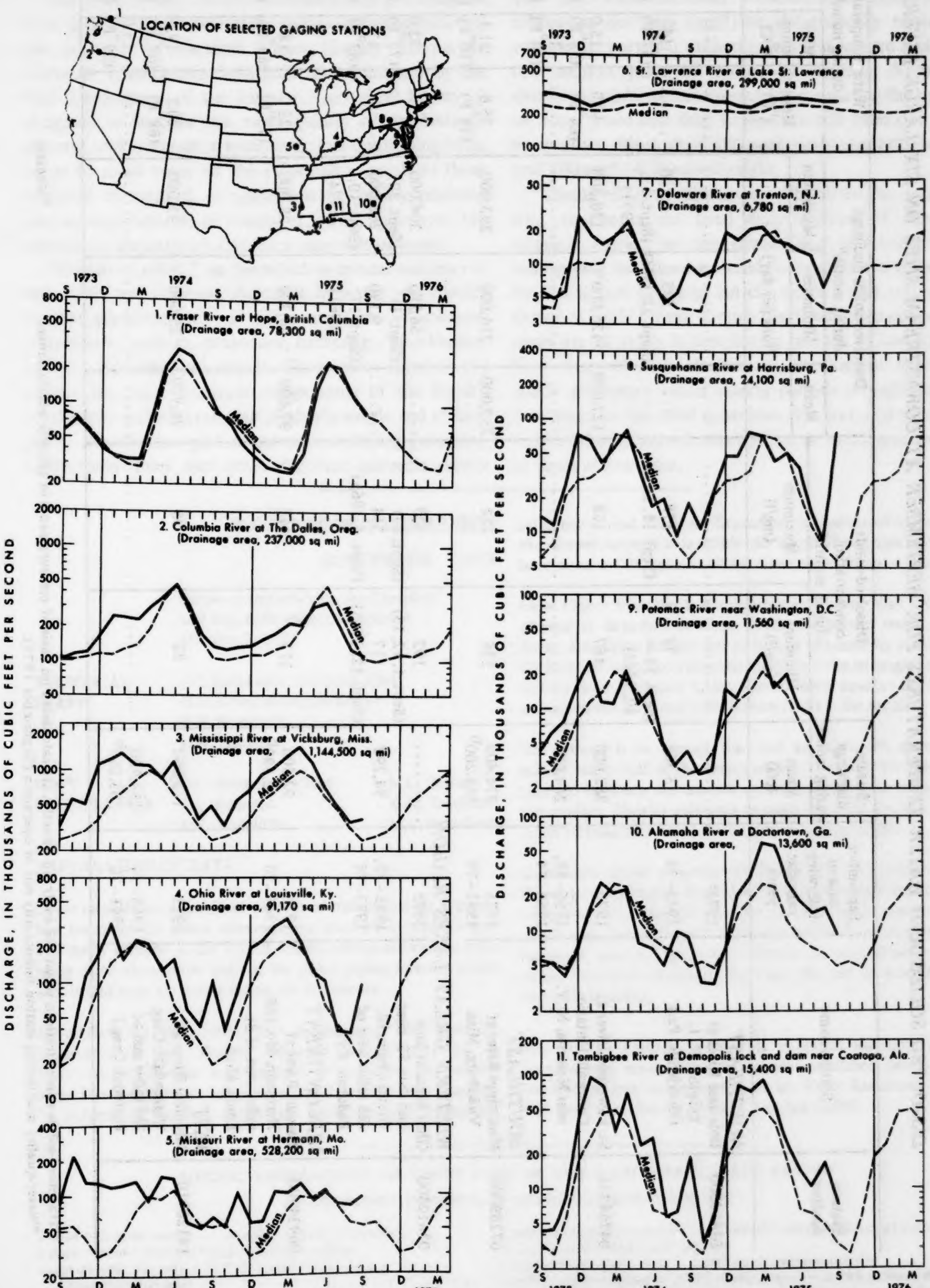


STREAMFLOW DURING SEPTEMBER 21–27, 1975*



*Streamflow compared with that occurring during the same 7 days of September of the 30-year reference period 1941–70. These 7 days of September indicate streamflow conditions near the close of the water year, ending September 30.

HYDROGRAPHS OF SOME LARGE RIVERS, SEPTEMBER 1973 to SEPTEMBER 1975



DISSOLVED SOLIDS AND WATER TEMPERATURES FOR SEPTEMBER AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	September data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month		
			Mean (cfs)	Minimum (mg/l)	Maximum (mg/l)	Mean (tons per day)	Minimum (tons per day)	Maximum (tons per day)	Mean (°C)	Minimum (°C)	Maximum (°C)
	NORTHEAST										
01463500	Delaware River at Trenton, N. J. (Morrisville, Pa.)	1975*	....	....	....	.....	....	....	......	.....	.....
		1945–74	5,366	71 (Sept. 21–30, 1945)	178 (Sept. 15, 1959)	.....	523 (Sept. 12, 1966)	4,720 (Sept. 13, 1971)	......	14 (57°F)	32 (89°F)
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N. Y.	1975	282,000	167	168	127,000	126,000	128,000	18.0 (64°F)	15.0 (59°F)	21.0 (70°F)
		1956–58, 1966–74	264,600	....	....	......	....	....	....	16 (60°F)	24.5 (76°F)
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1975	374,400	236	272	259,000	216,000	293,000	25.6 (78°F)	21.1 (70°F)	30.0 (86°F)
		1941–70	248,200[b]								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.)	1975	....	192 (Sept. 1, 12, 13)	307 (Sept. 27)	....	56,900 (Sept. 1)	304,000 (Sept. 30)	......	22.0 (72°F)	28.0 (82°F)
		1955–70, 1973–74	94,290	117 (Sept. 12, 1965)	314 (Sept. 6, 1965)	....	9,190 (Sept. 17, 1961)	202,000 (Sept. 10, 1974)	......	17 (62°F)	28.5 (83°F)
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1975	92,500	313	445	97,400	86,300	128,000	22 (72°F)	18 (64°F)	27 (81°F)
		1941–70	52,580[b]								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (30 miles east of Portland, Oreg.)	1975	110,000	82	95	26,900	25,000	32,000	20.5 (69°F)	19.5 (67°F)	21.0 (70°F)
		1968–74	114,900	....	....	....	....	....	......	15.0 (59°F)	21 (70°F)
		1941–70	105,200[b]								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.

[b]Median.

*Water-quality monitoring station temporarily out of operation (September 1975).

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR SEPTEMBER ON SIX LARGE RIVERS

The table at left shows dissolved-solids and temperature data for September at six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). NASQAN, as established by the U.S. Department of the Interior, Geological Survey, is designed to describe the water quality of the Nation's streams and rivers on a systematic and continuing basis, so as to meet many of the information needs of those involved in national or regional water-quality planning and management. As of January 1, 1975, there were 345 stations in the network (see back page of this issue).

"Dissolved solids," as described in several columns of the table, are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. These same minerals are among the most common components of the Earth's solid rocks and minerals, but gradually erode and at least partly dissolve as a part of natural weathering processes. Collectively these and other dissolved minerals constitute the dissolved-solids concentration expressed in milligrams per litre (mg/l) or the generally equivalent expression, parts per million (parts of dissolved matter in one million parts of water, by weight). Values of dissolved solids are convenient for comparing the quality of water from one time to another and from one place to another. Most drinking water contains between 50 and 500 mg/l of dissolved solids.

"Dissolved-solids discharge," expressed in tons per day, represents the total daily amount of dissolved minerals carried by the stream and is calculated by multiplying the dissolved-solids concentration (in mg/1) by the stream discharge (in cfs; times a unit conversion factor of .0027). Even though dissolved-solids *concentrations* are generally higher during periods of low streamflow than of high streamflow, the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

WATER RESOURCES REVIEW

SEPTEMBER 1975

Based on reports from the Canadian and U.S. field offices; completed October 7, 1975

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for September based on 22 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for September 1975 is compared with flow for September in the 30-year reference period 1931–60 or 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for September is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the uper quartile).

Flow higher than the lower quartile but lower than the uper quartile is described as being within the *normal range*. In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the September flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of September. Water level in each key observation well is compared with average level for the end of September determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels*, unless described otherwise, are from the end of August to the end of September.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 metre   1 mile = 1.609 kilometres
1 acre = 0.047 hectare = 4,047 square metres
1 square mile (sq mi) = 259 hectares = 2.59 square kilometres (sq km)
1 acre-foot (ac-ft) = 1,233 cubic metres
1 million cubic feet (mcf) = 28,320 cubic metres
1 cubic foot per second (cfs) = 0.02832 cubic metres per second = 1.699 cubic metres per minute
1 second-foot-day (cfsd) = 2,447 cubic metres per day
1 million gallons (mg) = 3,785 cubic metres = 3.785 million litres
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic metres per minute = 3,785 cubic metres per day

THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK——SOME QUESTIONS AND ANSWERS

The text, table, and map below are from the report, *The National Stream Quality Accounting Network (NASQAN)——Some questions and answers,* by John F. Ficke and Richard O. Hawkinson: U.S. Geological Survey Circular 719, 23 pages, 1975. This circular may be obtained free on request to U.S. Geological Survey, Branch of Distribution, 1200 S. Eads St., Arlington, Va. 22202.

NASQAN is a series of stations (fig. 1) at which systematic and continuing measurements are made to determine the quality of the Nation's streams. Design of the network specifies measurement of a broad range of water-quality characteristics (table 1) which were selected to meet many of the information requests of groups involved in planning and management on a national or regional scale. The primary objectives are (1) to account for the quantity and quality of water moving within and from the United States, (2) to depict areal variability, (3) to detect changes in stream quality, and (4) to lay the groundwork for future assessments of changes in stream quality.

Table 1.——*Characteristics measured at NASQAN stations*

[Frequencies: C, continous; D, daily; M, monthly; Q, quarterly]

	Frequency
Field determinations:	
Water temperature	[1] C, D, or M
Specific conductance	[1] C, D, or M
pH	M
Discharge	C
Coliform, fecal	M
Streptococci, fecal	M
Common constituents (dissolved): (Bicarbonate, carbonate, total hardness, non-carbonate hardness, calcium, magnesium, fluoride, sodium, potassium, dissolved solids, silica, turbidity, chloride, and sulfate).	[2] M or Q
Major nutrients:	
Phosphorus, total as P	M
Nitrite plus nitrate, total as N	M
Nitrogen, total Kjeldahl as N	M
Trace elements (total and dissolved): (Arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, selenium, and zinc).	Q

	Frequency
Organics and biological:	
Organic carbon, total	Q
Phytoplankton, total, cells/ml	M
Phytoplankton, identification of 3 co-dominants	M
Phytoplankton, 3 co-dominants, percent of total	M
Periphyton, biomass, dry weight g/m^2	Q
Periphyton, biomass, ash weight g/m^2	Q
Periphyton, chlorophyll *a*	Q
Periphyton, chlorophyll *b*	Q
Suspended sediment:	
Suspended sediment concentration	M
Percent finer than 0.062-mm sieve diameter	M

[1] Continuous or daily depending upon whether the station is equipped with a monitor or whether daily observations are made. Monthly measurements made at stations where a long-term record is available.

[2] Quarterly or monthly, depending upon whether relationships have been established between conductance and concentrations of various common constituents.

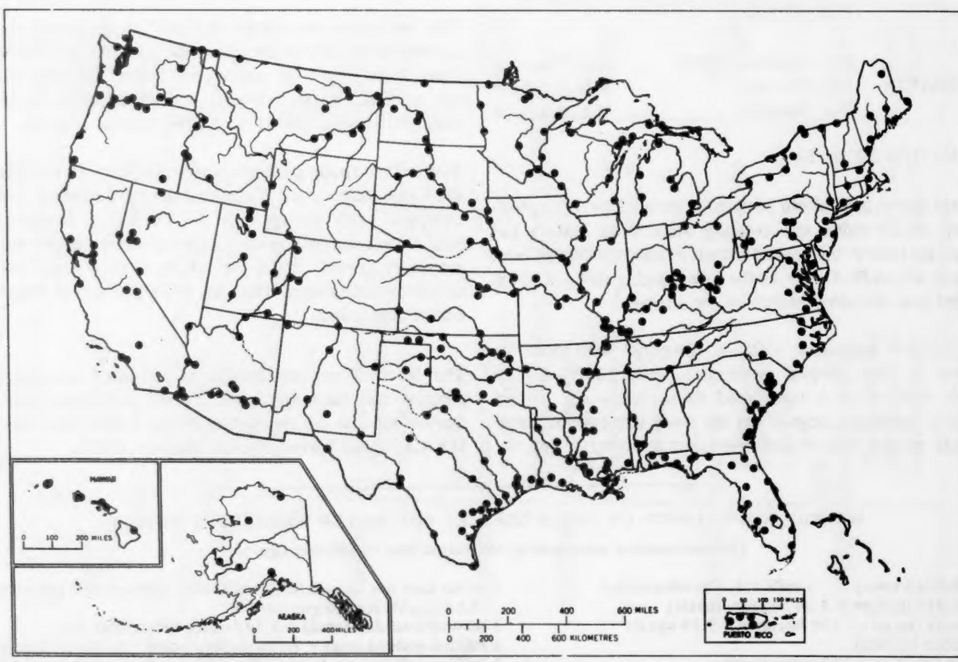

Figure 1.——NASQAN stations in operation as of January 1, 1975